Lesson 1 - Refrigeration Evaporators
Objectives:
- Identify various types of evaporators.
- Evaluate evaporator coil performance criteria.
- Select proper fin spacing for a particular application.
- Match the evaporator capacity to the condensing unit.
- Describe the evaporator selection process.
- Identify proper evaporator locations.
- Explain the need for defrosting.

Lesson 2 - Defrosting Methods
Objectives:
- Identify various defrosting methods.
- Describe the basic operation of each method.
- Explain the advantages and disadvantages of each method.

Lesson 3 - Capillary Tubes
Objectives:
- Explain the function of the capillary tube.
- Identify the capillary tube’s application characteristics.
- Explain the principles of capillary tube operation.
- Describe what should and should not be done to ensure satisfactory performance in a system that uses a capillary tube.

Lesson 4 - Thermostatic Expansion Valves (Part 1)
Objectives:
- Describe how a thermostatic expansion valve operates.
- Name the three pressures that affect the opening and closing of a TEV.
- Explain when a TEV with a remote charge is normally used.
- Specify where a gas-charged TEV should be installed in relation to the bulb.
- Explain the difference between internal equalizers and external equalizers.
- Discuss the importance of a properly selected TEV to the efficient operation of a refrigeration system.

Lesson 5 - Thermostatic Expansion Valves (Part 2)
Objectives:
- Name the factors that determine the correct type and size of TEV.
- Describe the precautions that you should take when installing a sweat-type TEV.
- Determine the proper location for the remote bulb of a TEV.
- Explain how to adjust superheat.
- Explain the general characteristics of replacement refrigerants, and describe their effects on TEVs.

Lesson 6 - Refrigeration System Controls
Objectives:
- Identify typical operating and safety controls.
• Explain the difference between instrument differential and operating differential.
• Describe the operation of a float switch.
• Explain why pilot-operated TEVs are used on large systems.
• Describe the operation of a constant-pressure expansion valve.
• Explain the function of evaporator pressure regulators, suction pressure regulators, and condenser pressure regulators.
• Explain the need for both high-side and low-side float valves.
• Describe the operation of the various types of solenoid valves.
• Explain the function of a refrigerant reversing valve.

Lesson 7 - Refrigerant Tables
Objectives:
• Use the refrigerant tables to help you:
  o set controls
  o compute head pressure for a specific set of operating conditions
  o adjust superheat settings
  o calculate net refrigeration effect
  o estimate normal discharge temperatures.

Lesson 8 - Refrigerant Properties and Characteristics
Objectives:
• Define the term "refrigerant".
• Recognize the physical and thermodynamic properties of several common refrigerants.
• Determine compression ratio.
• State the flammability and toxicity levels of commonly used refrigerants.
• Explain the undesirable effect of water in a refrigeration system.
• Determine the correct evaporator/condenser pressures for refrigerants that exhibit temperature glide.
• Explain the relationship between refrigerants and oils.
• Describe the effects of refrigerants on common metals and other materials.
• State the causes and effects of high compression ratios.
• Name several factors that affect the discharge temperature.

Lesson 9 - Refrigerant Designations
Objectives:
• Explain the significance of the ANSI/ASHRAE series designator for refrigerants.
• State the series number for each of the following compound classifications: methane-based, ethane-based, zeotropes, azeothropes, organic, and inorganic.
• Explain the significance of both upper-case and lower-case suffix letters in a designation.
• Interpret ASHRAE safety designations for toxicity and flammability.
• Define fractionation and temperature glide.
• Explain why only liquid should be used to charge a system with a blend.
• Write a molecular formula from a structural formula for simple compounds.
• Draw a structural formula from a molecular formula for simple compounds.
• Explain the difference between a recognized refrigerant and an approved refrigerant.
Lesson 10 - Oil in Refrigeration Systems
Objectives:
- List the properties required of a good refrigeration oil.
- Explain the term "solubility" as it relates to refrigerants.
- Describe several oil-related problems that can develop in refrigeration systems.
- Determine the effect on system capacity when oil is present in refrigerant.
- Explain the function of a crankcase heater.
- Explain the phrase "Pump-down cycle" and describe how it works.

Lesson 11 - Recover, Recycle, Reclaim
Objectives:
- Define the terms recover, recycle, and reclaim.
- Explain the de minimis provision of minor losses when refrigerant is being recovered.
- Determine what portion of a refrigerant cylinder’s maximum capacity can be safely filled to prevent hydrostatic bursting.
- Explain why cylinders must be evacuated before being used or recovery, why only refillable cylinders may be used, and why refrigerants must not be mixed.
- Describe the typical routine maintenance items for refrigerant recycling machines in general.

Lesson 12 - Safe Handling of Refrigerants and Cylinders
Objectives:
- Determine how much refrigerant can safely be put in a cylinder.
- Determine the temperature at which a cylinder would be 100% full or liquid, when the refrigerant liquid density and cylinder volume are known.
- Define the term water capacity.
- Determine when a cylinder needs to be retested.
- Identify refrigerant cylinders by color coding of the containers.
- List at least five safety procedures to be followed when handling refrigerant cylinders.
- Explain why a non-refillable cylinder must not be reused or converted.

Lesson 13 - Refrigeration System Piping (Part 1)
Objectives:
- Determine the maximum pressure drop for commonly used refrigerant piping.
- Describe various methods of ensuring the successful operation of an evaporative condenser.
- Explain the necessity of maintaining a minimum velocity in refrigerant piping.
- Calculate the subcooling necessary to prevent flash gas caused by static head.
- Describe ways in which liquid-line piping can improve the service of equipment.
- Explain how TEVs should be installed when evaporators are interconnected.
- Explain how to install sight glasses in liquid lines.

Lesson 14 - Refrigeration System Piping (Part 2)
Objectives:
- Explain why pressure drop must be minimized in refrigeration piping.
- Lay out a basic piping plan.
• Determine the allowable pressure drop in refrigeration piping.
• Utilize common pipe sizing tables, charts, and graphs.

Lesson 15 - Retrofits and Disposal Requirements
Objectives:
• Explain conversion procedures, and describe the components that need to be checked.
• Determine whether a component needs to be replaced or adjusted.
• Adjust controls to their proper settings.
• Explain why the filter-drier is so important.
• Determine when you should contact a component manufacturer for assistance.
• State what records need to be kept, and for how long.
• Describe the recovery and disposal process.
• Explain the proper method for disposing of waste oils and refrigerant oil filters.
• Define a "small appliance."